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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/597,739

08/04/2006

Ali S. Sadri

1020.P17140

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11/07/2008

KACVINSKY LLC  
C/O INTELLEVATE  
P.O. BOX 52050  
MINNEAPOLIS, MN 55402

EXAMINER

BAIG, ADNAN

ART UNIT

PAPER NUMBER

4172

MAIL DATE

DELIVERY MODE

11/07/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/597,739	<b>Applicant(s)</b> SADRI ET AL.	
	<b>Examiner</b> ADNAN BAIG	<b>Art Unit</b> 4172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/4/2006</u> .  | 6) <input type="checkbox"/> Other: _____                          |

***Claim Objections***

1. Claims 8-10 are objected to because of the following informalities: Claims 8-10 are interpreted as being dependant of claim 7. Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 15-17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The subject matter claimed, in accordance with applicants specification is a computer program with instructions that is not executable because it has to be compiled and installed which is a non tangible medium. [0023] lines 18-21

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7 and 9-18 are rejected under U.S.C. 102(b) as being anticipated by Ketchum (US 2003/0185310).

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Regarding claim 1,

Ketchum discloses a method comprising:

estimating a channel impulse response matrix; [0081] [0080] Lines 1-5,

creating a crosstalk suppression filter matrix based on said channel impulse response matrix; [0007] Lines 3-11

Fig. 1 illustrates the impulse response for the received symbol vector  $r(n)$  wherein a noise vector  $Z(n)$  is processed at the receiver, and is transmitted through a suppression filter.

filtering a plurality of data streams received over a channel for a multiple input multiple output system to reduce far end cross talk between said data streams using said crosstalk suppression filter matrix; ([0007] Lines 1-3, Lines 13-18)

Regarding Claim 2,

Ketchum discloses the method of claim 1, wherein said channel impulse response matrix and said crosstalk suppression filter matrix have a substantially similar structure and matrix dimension. Ketchum describes in [0042] Lines 1-7 the filter as in claim 1, matched to the impulse response in the equivalent channel.

In [0044] Ketchum discloses a formula that clearly shows that the matrices of said channel impulse response and suppression filter are equal. Paragraphs [0045-0048] discuss the properties of said channel impulse response and suppression filter.

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Regarding Claim 3,

Ketchum discloses the method of claim 1, wherein said estimating comprises:

Estimating at least one channel characteristic for said channel; [0018] Lines 3-8

Approximating a plurality of channel impulse response values based on said channel characteristic; [0020] lines 1-5,

Ketchum shows that multiple “symbol streams” or response values can be transmitted over a channel.

Creating said channel impulse response matrix using said channel impulse response values [0020-0022].

Interpretation of the claim language with respect to applicant's specification shows the signals are predetermined for the response values at the receiving end. Ketchum discloses that a number of received signals or “response values” are preconditioned based on an estimated response of the MIMO channel which in return forms a channel impulse response matrix. [0007] lines 1-6,

The signals communicated between the transmitter and receiver over the channel once the characteristic is measured, are shown to be predetermined by Ketchum. [0030] lines 1-6.

Ketchum explains that each individual channel in the system is dependent on the channel impulse response matrix which in turn, influences the number of independent channels. [0018],

Regarding Claim 4,

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Ketchum discloses a method according to claim 1, wherein said creating comprises transposing said channel impulse response matrix; [0042]

Substituting each element of said transposed channel impulse response matrix with its minor element; [0114]

Substituting each element of said CIR matrix with its minor element is interpreted as convolution in the claim with respect to the applicant's specification.

The paragraph illustrates convolution being performed on said transposed channel impulse response matrix.

And determining a sign for each minor element;

[0126] [0127 lines 1-5]. Determining a sign for each minor element is interpreted as convolution values in the claim with respect to the applicant's specifications. The paragraphs cited, determine the order for the convolution values or "minor element" based on the values sign.

Regarding Claim 5,

Ketchum discloses the method of claim 1, wherein each data stream comprises an inter-symbol interference signal. [0036]

Regarding Claim 6,

Ketchum discloses a method of claim 1, further comprising equalizing each data stream using a set of substantially similar equalization parameters. [0060]

Regarding Claim 7,

Ketchum discloses a multiple input multiple output system, comprising:

a communications medium;

a plurality of transmitters to connect to said communications medium, with each transmitter to transmit a data stream over said communications medium using a communications channel;

a plurality of receivers to connect to said communications medium, said plurality of receivers to receive said data streams from said communications channel; and

a crosstalk filtering module to connect to said plurality of receivers, said crosstalk filtering module to filter said data streams to reduce far end crosstalk noise incurred by said data streams during said transmission. (Fig. 1 and Fig. 3)

Ketchum illustrates a MIMO system in Fig. 3 where section 300 illustrates the plurality of transmitters and receivers connected to communications medium 310.

Fig. 1 section 170 illustrates a crosstalk filtering module connecting to the receivers of said MIMO system. [0034] Lines 1-9.

Regarding Claim 9,

Ketchum discloses the MIMO system of claim 8, further comprising a channel estimator to connect to said receivers, said channel estimator to estimate at least one channel characteristic for said channel. [0112]

Regarding Claim 10,

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Ketchum discloses the MIMO system of claim 7, wherein said crosstalk filtering module comprises;

a channel impulse response matrix generator to generate a channel impulse response matrix;

Paragraph [0040] discloses TX and RX MIMO processors which generate the channel impulse response matrix in the MIMO communication system as illustrated in Fig. 1.

Paragraph [0112] discloses that the RX MIMO processor transmits or generates the estimated channel impulse response.

a crosstalk suppression filter matrix generator to generate a crosstalk suppression filter matrix using said channel impulse response matrix; and

a filter to filter said data streams using said crosstalk suppression filter matrix.[0034] lines 1-6

Regarding Claim 11,

Ketchum discloses an apparatus comprising:

a plurality of receivers to receive a plurality of data streams transmitted over a communications channel; and

a crosstalk filtering module to connect to said plurality of receivers, said crosstalk filtering module to filter said data streams to reduce far end crosstalk noise incurred by said data streams during said transmission. (Fig. 1 and Fig. 3)

Ketchum illustrates a MIMO system in Fig. 3 where section 300 illustrates the plurality of transmitters and receivers connected to communications medium 310.

Fig. 1 section 170 illustrates a crosstalk filtering module connecting to the receivers of said MIMO system. [0034] Lines 1-9.

Regarding Claim 12,

Ketchum discloses the apparatus of claim 11, wherein said crosstalk filtering module comprises:

a channel impulse response matrix generator to generate a channel impulse response matrix;

Paragraph [0040] discloses TX and RX MIMO processors which generate the channel impulse response matrix in the MIMO communication system as illustrated in Fig. 1.

Paragraph [0112] discloses that the RX MIMO processor transmits or generates the estimated channel impulse response.

a crosstalk suppression filter matrix generator to generate a crosstalk suppression filter matrix using said channel impulse response matrix; and

a filter to filter said data streams using said crosstalk suppression filter matrix. [0034] lines 1-6

Regarding Claim 13,

Ketchum discloses the apparatus of claim 11, further comprising a channel estimator to connect to said receivers, said channel estimator to estimate at least one channel characteristic for said channel. [0112] Lines 1-5. See Fig. 5

Regarding Claim 14,

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Ketchum discloses the apparatus of claim 13, wherein said channel impulse matrix generator is to connect to said channel estimator, and said channel impulse matrix generator is to use said at least one channel characteristic for said channel to generate said channel impulse matrix.

Paragraph [0112] lines 1-5,

Discloses that the channel estimator sends or generates an estimated channel impulse response matrix.

Regarding Claim 15,

Ketchum discloses an article comprising:

a storage medium;

said storage medium including stored instructions that, when executed by a processor, result in estimating a channel impulse response matrix [0080] Lines 1-5, [0081].

creating a crosstalk suppression filter matrix based on said channel impulse response matrix, [0007] Lines 3-11.

Fig. 1 illustrates the impulse response for the received symbol vector  $r(n)$  wherein a noise vector  $Z(n)$  which is processed at the receiver, and is transmitted through a suppression filter.

and filtering a plurality of data streams received over a channel for a multiple input multiple output system to reduce far end cross talk between said data streams using said crosstalk suppression filter matrix. [0007] Lines 1-3, Lines 13-18

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Regarding Claim 16,

Ketchum discloses the article of claim 15, wherein the stored instructions, when executed by a processor, further result in said estimating by estimating at least one channel characteristic for said channel, [0018] Lines 3-8.

approximating a plurality of channel impulse response values based on said channel characteristic, [0020] lines1-4,

Ketchum shows that multiple “symbol streams” or response values can be transmitted over a channel.

The signals communicated between the transmitter and receiver over the channel once the characteristic is measured, are shown to be predetermined by Ketchum. [0030]

creating said channel impulse response matrix using said channel impulse response values. [0020-0022] [0028-0030].

Ketchum discloses that a number of received signals or “response values” are preconditioned based on an estimated response of the MIMO channel which in return forms a channel impulse response matrix. [0007] lines 1-6,

Ketchum explains that each individual channel in the system is dependent on the channel impulse response matrix influences the number of independent channels. [0018].

Regarding Claim 17,

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Ketchum discloses the article of claim 15, wherein the stored instructions, when executed by a processor, further result in said creating by transposing said channel impulse response matrix, [0042]

substituting each element of said transposed channel impulse response matrix with its minor element, [0114]

Substituting each element of said CIR matrix with its minor element is interpreted as convolution in the claim with respect to the applicant's specification.

The paragraph illustrates convolution being performed on said transposed channel impulse response matrix.

and determining a sign for each minor element. [0126] [0127] lines 1-5

Determining a sign for each minor element is interpreted as convolution values in the claim with respect to the applicant's specifications. The paragraphs cited, determine the order for the convolution values or "minor element" based on the values sign.

Regarding Claim 18,

Ketchum discloses the article of claim 15, wherein the stored instructions, when executed by a processor, further result in equalizing each filtered data stream using a set of substantially similar equalization parameters. [0060]

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ketchum (US 2003/0185310) in view of Erickson (US 6,978,015).

Regarding Claim 8,

Ketchum discloses a multiple input multiple output system of claim 7 which reduces crosstalk, but does not use a plurality of equalizers to connect to said filtering module. Erickson discloses a communications network wherein multiple equalizers are implemented in Fig.4 for cross talk compensation. (Col. 10 Lines 45-57). Therefore it would have been obvious to one of ordinary skill in the art to use a plurality of equalizers in a multiple input multiple output system to filter distortion from the data streams for reducing crosstalk noise.

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### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADNAN BAIG whose telephone number is (571) 270-7511. The examiner can normally be reached on Mon-Fri 7:30m-5:00pm eastern every other Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis West can be reached on 571-272-7859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ADNAN BAIG/  
Examiner, Art Unit 4172

/Lewis G. West/

Supervisory Patent Examiner, Art Unit 2618